



HAL
open science

Antifungal and antimycotoxin mechanisms of stilbenoids: an omics study of *F. graminearum*

Trang-Minh Tran, Nadia Ponts, Stéphane Bernillon, Laëtitia Pinson-Gadais, Pierre Waffo-Téguo, Caroline Rouger, F. Richard-Forget, Vessela Atanasova

► To cite this version:

Trang-Minh Tran, Nadia Ponts, Stéphane Bernillon, Laëtitia Pinson-Gadais, Pierre Waffo-Téguo, et al.. Antifungal and antimycotoxin mechanisms of stilbenoids: an omics study of *F. graminearum*. EFS16 16th European Fusarium Seminar, Sapienza University of Rome, Jun 2023, Rome, Italy. hal-04179120

HAL Id: hal-04179120

<https://hal.inrae.fr/hal-04179120v1>

Submitted on 9 Aug 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Antifungal and antimycotoxin mechanisms of stilbenoids: an omics study of *F. graminearum*

Trang-Minh Tran¹, Nadia Ponts¹, Stéphane Bernillon¹, Laëticia Pinson-Gadais¹, Pierre Waffo-Téguo², Caroline Rouger², Florence Richard-Forgeot¹ and Vessela Atanasova¹

¹INRAE, RU1264 Mycology and Food Safety (MycSA), 71 Avenue Edouard Bourlaux, 33140 Villenave d'Ornon, France,

²University of Bordeaux, RU Enology, EA 4577, USC 1366 INRAE, Molecules of Biological Interest, ISVV, 210 Chemin de Leysotte, 33882 Villenave d'Ornon, France; trang.tran@kuleuven.be

An increase in contamination of agricultural commodities with mycotoxins forced by climate change becomes an intractable problem worldwide, alarming intercontinental food security. On the other hand, to lessen the use of agrochemicals, seeking environmentally-safe antimycotoxin agents is urgent action. This current study aims at elucidating the antifungal and antimycotoxin modes of action of main active stilbenoid molecules derived from vine by-product extracts via treatments with *Fusarium graminearum* fungus – the primary causal agent of *Fusarium* Head Blight of wheat and the main producer of type B trichothecene (TCTB) mycotoxin. A monomer resveratrol (RES, 35 μ M) and a tetramer vitisin B (VIT B, 8 μ M) were the two designated candidates due to their predominance in the extracts. An array of the *in vitro* fungicidal bioactivities of the molecules, consisting of anti-spore germination, and inhibition of biomass production and TCTB yield, were proved in which the fungus was significantly susceptible to VIT B rather than RES. To deeper understand their modes of action underlying the antifungal and antimycotoxin activities, multi-omics approaches including mRNA-seq-based transcriptomics and LC-MS/MS-based nontargeted metabolomics were performed. The mRNA-seq data illustrated a significantly fungal global transcriptomic regulation induced by VIT B. Approximately 7,000 genes were differentially expressed upon exposure to VIT B compared to the untreated control at both 3 and 5 days post inoculation (dpi), while a very slight fungal transcriptomic regulation was observed for RES. In conjunction with metabolomics data, our study provided comprehensive insights into the modes of action of the active molecule VIT B. These findings hold promise for developing novel biofungicides exploiting viticulture wastes in order to contribute to lowering the contamination of cereals with mycotoxins and add value to the undervalued vine by-products.